

# PATENT SPECIFICATION

607,432



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## PROVISIONAL SPECIFICATION

### Apparatus for use in the Belling of Tubes

We, INTERNATIONAL COMBUSTION LIMITED, a British Company, of Nineteen Woburn Place, London, W.C.1, and REGINALD HORACE ALONZO DYER, a British Subject, of 88 Allestree Lane, Allestree, Nr. Derby, do hereby declare the nature of this invention to be as follows:—

The present invention relates to apparatus for use in connection with the expansion and belling of tubes, and more particularly boiler tubes.

In the fixing of boiler tubes into pressure vessel seatings it is customary to expand the tube by plastic deformation on either side of the seating by means of which contact is made with the pressure vessel, and also to bell the mouth of the tube.

It has hitherto been the usual practice to perform these two operations by means of a combined expanding and belling device in which expanding rollers are followed by one or two belling rollers.

It has been found, however, that effecting combined expansion and belling in a single operation gives rise to practical difficulties, such as eccentric belling of the mouth and relaxing of the expanded seat.

According to this invention these drawbacks are eliminated by the employment of an independent belling tool which acts in the manner of a rotary drifting device.

The device comprises rollers rotatably mounted between two plates or the like, and

adapted to make contact with a central guide roller that ensures concentric rolling, the device being provided with a ratchet or other device for rotating the tool and a centreing screw for feeding the tool into the tube during operation.

The device is conveniently in the form of a metal cage provided with two plates spaced apart from one another by distance pieces, and provided with holes for the reception of trunnions secured to the first mentioned rollers which are tapered. The central roller is also tapered, but in the reverse direction to that of the other rollers. The ratchet handle is supported by one of the two plates, or by a suitable extension socket.

In an alternative arrangement the outer roller are hollow and rotate on spindles. The centre roller is arranged to be adjustable so that the outer rollers may be set on a pitch circle suitable to the size of tube to be belled.

The centre roller may be arranged to thrust against a hardened ball bearing housed in the top plate of the cage.

Dated this 4th day of February, 1946.

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## COMPLETE SPECIFICATION

### Apparatus for use in the Belling of Tubes

We, INTERNATIONAL COMBUSTION LIMITED, a British Company, of Nineteen Woburn Place, London, W.C.1, and REGINALD HORACE ALONZO DYER, a British Subject, of 88 Allestree Lane, Allestree, Nr. Derby, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to a tool for use in connection with the expansion and

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belling of tubes, and more particularly boiler tubes.

In the fixing of boiler tubes into pressure vessel seatings it is customary to expand the tube by plastic deformation on either side of the seating by means of which contact is made with the pressure vessel, and also to bell the mouth of the tube.

It has hitherto been the usual practice to perform these two operations by means of a combined expanding and belling device in

which expanding rollers are followed by one or two belling rollers.

It has been found, however, that effecting combined expansion and belling in a single operation gives rise to practical difficulties, such as eccentric belling of the mouth and relaxing of the expanded seat.

A belling tool according to this invention is in the form of a belling device having a plurality of tapered rollers adapted to make contact with a central tapered guide roller, the taper of the latter being in the inverse direction to that of the rotatable rollers and the central roller being adjustably mounted in order that the outer rollers may be set on a pitch circle suitable to the size of the tube to be belled.

The outer rollers are mounted between two plates or the like, and the device is provided with a ratchet or other device for rotating the tool and a centreing screw for feeding the tool into the tube during operation.

The device is conveniently in the form of a metal cage provided with two plates spaced apart from one another by distance pieces, and provided with holes for the reception of trunnions secured to the first mentioned rollers which are tapered. The central roller is also tapered but in the reverse direction to that of the other rollers. In an alternative arrangement the outer rollers are hollow and rotate on spindles. The centre roller is arranged to be adjustable so that the outer rollers may be set on a pitch circle suitable to the size of tube to be belled.

The centre roller may be arranged to thrust against a hardened ball bearing housed in the adjusting screw in the top plate of the cage.

One form of construction of tool in accordance with the invention is illustrated in the annexed drawings, in which:

Fig. 1 is a sectional elevation, and

Fig. 2 is a plan,

Fig. 3 is a detailed view of a slightly modified arrangement.

Referring first to Figs. 1 and 2, *a* is a tube to be belled, and *b* is its seating. The device comprises a cage in which the tool is mounted, and which comprises a front plate *c* and a back plate *d*, the two plates being spaced apart from one another by distance collars or stud bolts *e*. The plates are provided with holes *g* for the

reception of trunnions *h* secured to rotatable tapered rollers *j*, each of which engages a central guide roller *k* which is also tapered, but in the inverse direction to that of the rollers *j*. Secured to the plate *c* is a squared spindle *l* to which a ratchet handle (not shown) can be attached for the purpose of rotating the tool. The spindle *l* carries a centreing screw *m* for feeding the tool into the tube during operation. The back plate *d* carries an adjusting screw *n* for the roller *k* to enable the outer rollers to be set on a pitch circle suitable to the size of tube to be belled and ball bearing *o*. In the slightly modified arrangement shown in Fig. 3 the outer rollers *j* are replaced by sleeves *j'* loosely mounted on the members *e*.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A tool for use in connection with the expansion and belling of tubes, such tool being in the form of a belling device having a plurality of tapered rollers adapted to make contact with a central tapered guide roller, the taper of the latter being in the reverse direction to that of the rotatable rollers, and the central roller being adjustably mounted in order that the outer rollers may be set on a pitch circle suitable to the size of tube to be belled.

2. A tube belling tool according to Claim 1 in which each rotatable roller is provided with trunnions that respectively engage holes in plates that are spaced apart from one another in a cage or casing.

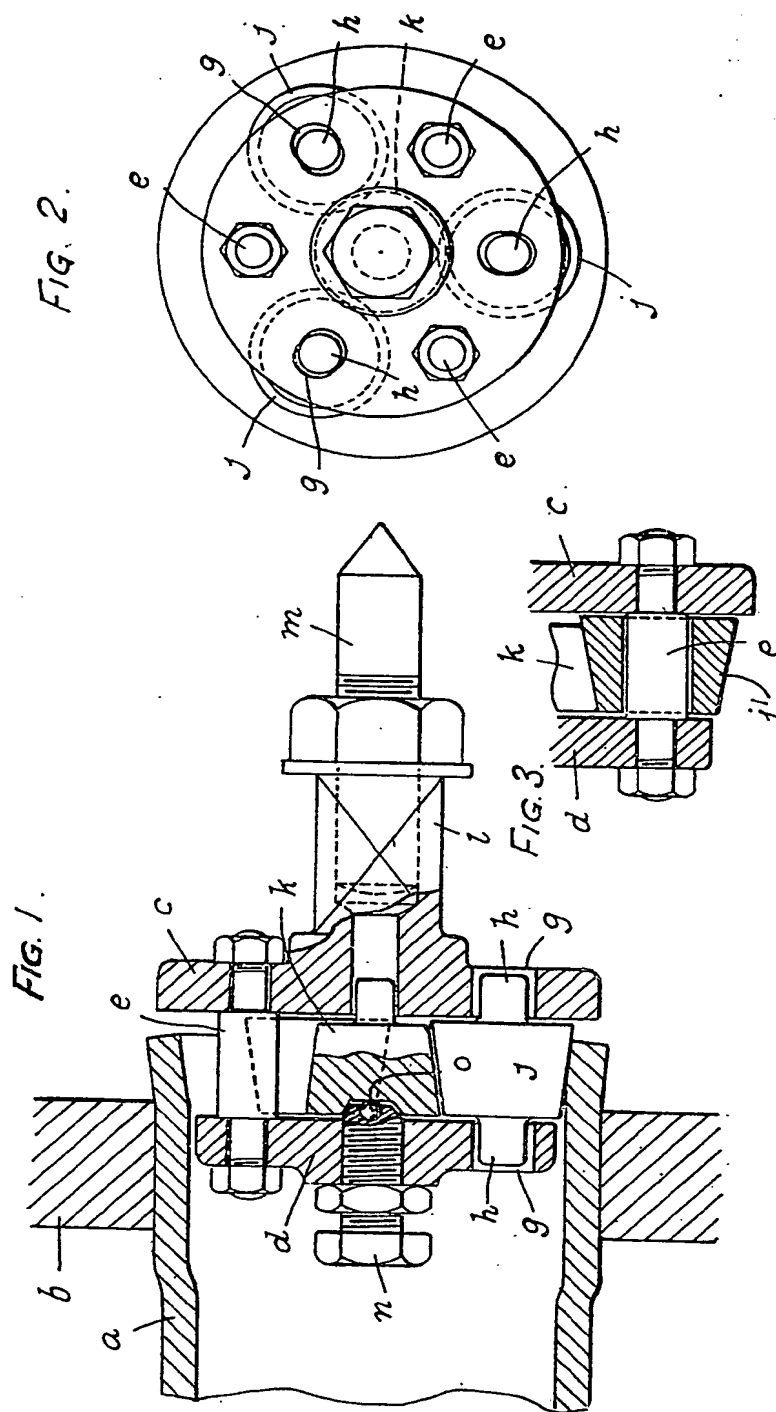
3. A tube belling tool according to any one of the preceding claims in which the device is adapted to be rotated by means of a ratchet handle that engages a square spindle that carries a centering screw for feeding the tool into a tube.

Dated this 15th day of November, 1946.

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[This Drawing is a reproduction of the Original on a reduced scale.]



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